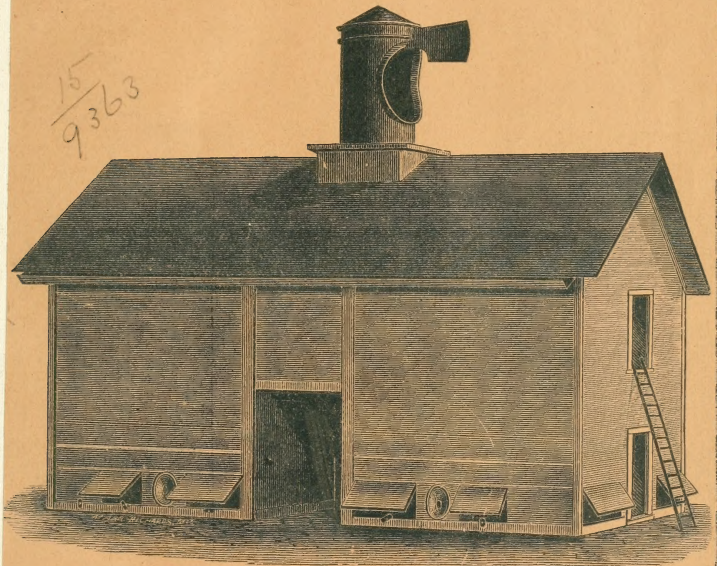
TOBACCO,

How Grown and Prepared for Market,

With an explanation of the plan of the Author's



NEW TOBACCO CURING HOUSE.

And an illustration of its new system and method of curing tobacco, with full practical details of the

Growing, Curing, Stripping, Sorting, Packing and Marketing Tobacco.

From the experience of a practical grower.

BY N. BRUETTE.

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TOBACCO.

How Grown, Cured and Prepared for Market.

INTRODUCTION.

In presenting this treatise to that portion of the public interested directly in the matter of which it treats, I am not unmindful of the fact, that able and experienced persons, well informed upon all the details of the work of growing tobacco, have written and published much of their experience and observation for the instruction of those who have proposed to embark in the business, as a new pursuit, as also thoughts and suggestions for the consideration of those who have followed the business of growing tobacco. A debt of gratitude is due to those careful and observant growers, whose matured experience has been furnished to the world, to the end that progress and improvement should be stamped upon every year's growth of this important staple. In most of the pursuits of life, mankind seems imbued with a fatal tendency in each individual to cling to, and follow perverse notions or impulses, and a disinclination to profit by the wisdom and experience of others; and yet mankind hails, with more or less enthusiasm, all attempts to enlighten it, upon those subjects, that increase the pleasures and enjoyments of life, or that lessen its burdens. So, I gladly avail myself of the opportunity to acknowledge the obligations I am under to those pioneers in this branch of industry, who have given the world the benefit of the lessons they have learned, in the struggle with natural forces; for while the Creator has not barred man's hand, from nature's deepest mysteries, it yet will yield them up, only to patient and thoughtful workers. I too have been a worker, and have had my share of failures, with some successes, in this field, and these

I present to those who will study them. In the course of this work, I shall allude to some ideas, that have been advanced by others, which, I maintain, are unsound in principle, and not in accordance with natural laws, and that ought for those reasons to be abandoned. He who invokes nature to aid him, in the perfection of his product, must be sure and follow where she leads, in the application of principles, to the details of his work. If he is careless, and blunders, or misapplies them, he will find his mistake in those defects, which he had sought to avoid. The mistakes in any one field of industry ought not to be duplicated, in these days of inquiry and of rapid spread of intelligence. The errors ought soon to be found and dropped.

And it is pleasant to know, that these are days of inquiry, and of research, and that only what is fit can survive. In the mass of information, from so many sources, respecting the work of growing a crop of tobacco, there is not very much difference of opinions; reference being had of course, to the wide range of latitude, and of soil and climate, within which the plant is grown; and whence emenate the various essays upon the subject. There are certain general principles, which will be applicable to all latitudes, and other principles, equally important, which require a knowledge and application more local in their character, and this will also apply to the varieties of tobacco grown in different localities. I could fairly content myself, to leave the subject of growing the crop, to rest on the information and practice, now prevailing, as in nothing which I shall say, will there be a very great departure from methods now pursued; but as in a most serious and important part of the business, of growing and preparing the crop for market, I shall attack the system and methods now prevailing, and strenuously and earnestly insist that they are wrong in principle, wasteful and illogical, and in reckless disregard of natural law; and bring forward what can be shown to be a better way, it would seem to be best, that I should go over the entire field and point out, what has seemed to me, defective methods in all the stages of growing the crop.

In presenting to tobacco growers, my new tobacco curing house, I do so, with the greatest confidence that it will meet all just expectations, provided only, they carefully observe the rules and instructions, which are laid down even to the minutest details, and which provide for any, and all climatic conditions, which can arise in any climate where tobacco will grow. Growers will understand, without more being said, that these rules are adapted to this curing house, and apply to no other, excepting a few general principles. All the details are essential, to the whole plan, and will surely bring out the desired result. I do not abate any confidence in the plan and method of this curing house, from the fact that it is a clear departure from old methods; twenty years of growing, and handling tobacco, and of careful study and experiment, and observation of the plant, and of the climatic conditions affecting its growth, ripening and curing, have satisfied me, that the immense commercial

importance of the product, demands for it a treatment and a method, more in accordance with well understood philosophical laws. This will be further illustrated as I come to each successive step in the work, where the subject of curing the crop is dealt with, and the reasons for each and every suggestion or rule will be given.

In the pursuit of my inquiries and experiments, I have from time to time found articles, upon tobacco growing and curing, in the N. E. Homestead, and in the Wisconsin Tobacco Reporter, that have furnished me valuable aid, in my work, and I desire to acknowledge my obligations for the same. In the line of their thought, and so far as they went, they are in the main sound and correct. The pressure of the necessity which I saw for both better results and how to obtain them have caused me to venture further; and in pursuit of the idea I have constructed a large curing house, and have conscientiously embodied into its plan the ideas as to the curing of tobacco which I present in this treatise; and in order that I might be certain that they have a good foundation and to thoroughly and well test those ideas and principles, I filled it full of tobacco, and subjected it to the treatment which I advocate. The cured tobacco has been assorted and cased by experts and who have examined with careful scrutiny, in the sweat and after it had emerged from that trial. It has been handled and worked by experts in manufacture of leaf tobacco, and it more than vindicates my curing house and its plan. The public has now all the facts and all persons who are interested can get them. And I believe the time may be safely anticipated when we will note the disappearance of poor half cured tobacco from the market, and the terrors which have burdened the growers life will disappear with them.

N. BRUETT.

Jefferson, Wis., January 5, 1887.

Chapter I.

SELECTION AND PREPARATION OF THE LAND.

Information as to this part of the work might, in general terms, be sufficient for the beginner, but one who has had experience has been taught lessons which are better than oral ones, because written instructions are maxims, which saying what to do and what not to, must yet be governed by the difference of conditions in different localities. I have, therefore, thought it better to describe my own field of ten acres, on which tobacco has been grown more or less for over twenty years, hoping thus to present to new beginners a better idea of favorable conditions, than I could hope to do in general directions.

Its eastern side rises to upland, with a sandy clayish loam, resting on a reddish soft clay subsoil, and sloping to the west, onto bottom land, of black sandy loam, resting on a common brick clay subsoil. This bottom comprising about seven acres, is well drained with tile, there being about 150 rods of tile laid in the seven acres; the mains being three inch, the side branches being one and a half inch; a design in placing it, being to tap some springs, which were found to exist, below the surface, in areas of quick sand, along the base of the slope. Upon this field I have often grown a ton of seed leaf to the acre; and in the year 1873, I grew and weighed into the cases, 5,600 pounds of Connecticut seed leaf from two acres of that lower land, and sold it to Mr. Gaeger, of Philadelphia, in that bad time of low prices for eight cents a pound. In 1875 I abandoned seed leaf and am now growing Spanish, or Havana seed, and the soil and locality seem equally well suited to that variety, producing from ten hundred to fifteen hundred pounds to the acre. This is not the place to discuss tile draining, but I cannot forbear adding my testimony in its favor, and to give it the emphasis of experience, that it will improve the quality and increase the quantity of tobacco, in even the very best soils and localities. If your proposed field is upon bottom land, do not attempt tobacco before it is drained, for you will be disappointed. Tobacco will not thrive upon a soil from which the main part of the waterfall must be evaporated into the atmosphere, instead of through the subsoil, leaving the surface sour and hard and without life. Above all, avoid a hard pan for subsoil, no matter how rich the surface soil may be, it will defeat all the kind endeavors of sunshine or rain, supplemented by your toil, and I have examined fields of growing tobacco, where location and manuring

and cultivation were all that could be desired, and yet in spite of all these, the plants were short, hard and woody, and early exhibited rust spots, and an entire want of generous growth; and upon examination, I have found such fields resting either upon a hard pan or sticky, gravelly, clay subsoil. It should be observed here, that upon almost any good soil, tobacco may be successfully grown, but the quality of the crop will be modified in this way. If your sandy loam has a slight mixture of clay loam, the grain of the leaf will be finer for it, while if sand alone, the fiber will be elastic, but the grain will be more open and coarser. The fine grained is the handsomer leaf, other things being equal, and care should therefore be exercised, to so locate the field, as will secure the best results in these respects.

Having located the field, it should be heavily manured and plowed in September; should then have another dressing of manure, and plowed again about the first of November following. This will give the soil the benefit of the autumn rains, and the freezing, following the last plowing, will pulverize the clods and lumps, and render it light and porous, for the coming season. You may now leave the field to the winter forces, as they can do for it all that will be necessary for the growth of your crop.

THE TOBACCO BEDS.

These should be selected in the fall, in a spot sheltered from cold winds; and almost any soil, except clear sand, in a warm spot will do well. Spade the bed in the fall, in October or the first of November, and work in a liberal quantity of rich well rotted manure, make it mellow with the fork and rake, and leave it in just the shape you want it in the spring, and cover it with a thin coat of fine manure, compost, and it will be well if a large per cent. of this covering is hen manure. In the spring, as early as the ground can be worked, say about the last week of April, or first of May, rake off the covering of manure from your beds, and with fork and rake, make the surface of the soil as fine and mellow as it is possible, about two or three inches deep, not more, and having prepared your seed, as hereafter shown, sow it on this warm mellow surface. Having done so, take a short narrow board and place it upon the bed, and put your weight upon it, and pressing it down, as much as is possible, moving the board about the bed so that its whole surface has been pressed down even. Do not do this work hastily, but with care, laying your board lengthwise and crosswise of the bed, to insure a covering of all the seeds sown.

In ordinary loamy soil, this manner of covering the seeds is all they will bear, as the seed is so small that there is danger of burying so deep that it will not sprout, or if it should succeed in forcing its way out, it will appear so late that the early sprouted will so overshadow it that it can not get such a hold of the soil, as will produce a healthy plant, available for planting. It is desirable that all or nearly all the seeds should germinate at about the same

time. There will be a few days difference, in their growth, in any event, and this will keep your bed productive during the planting season.

The best way to sow the seed, is to first determine how much you need, then take a quantity of leached ashes, or partly leached, about one quart to each tablespoonful of seed, first thoroughly sifting the ashes, to put out all lumps, then placing the ashes in a pan, smooth down the surface and scatter the seed over the ashes as evenly as possible, then mix all together with your hands, put it all through your sieve, once or twice, that the seed may be evenly distributed through the mass. When that is done, scatter it all upon your prepared bed, being still careful to have it evenly distributed over the beds. There are other substances like rotten wood or leaf mold, that may be used in place of ashes, only see that it is pulverized and free from lumps, as they will carry down too many seeds, and the plants will come up in clusters and be wasted.

It is important to a beginner, that he should be informed as to the reasons of these rules, which are given him, and I proceed now to state them. The preparing of the seed bed in the autumn, gives time for the rains and snows to settle the ground, and absorb the strength of the manure; and lumps and clods will fall to pieces, and form a good body of prepared soil beneath the plants, which will hold moisture, stored for their use when growth begins. The shallow preparation of the surface, in the spring, is because you do not want long tap roots to your plants, but instead a thick clump of fibrous roots, close about the base of the stalk. Such a plant, set in a well made hill, with moist soil will not only live, but it will immediately begin its growth, and it will continue through a protracted drought, until maturity. The surface of the bed being well worked, warm and rich, the plant finds sufficient food and will not send down its tap root into the colder and harder soil below. Whereas, if the bed is made deep and mellow, the tap root will push down into it, and control the growth, which will be a long tap root growth, and when transplanted into the field it will be the same character of growth there, and will dominate and determine the kind of leaf which the plant will bear. It is now well understood that a fine leaf must be grown from the surface soil, that is soil that is stirred by the cultivator and hoe, into which the warm sun penetrates every hour of the day, and which is moistened by every shower of rain, and upon which the dew falls. The leaf from such a growth will be thin, and of delicate texture, both in the blade and in the veins. The sub-soil, or the lower part of the surface soil, can contribute nothing of value to such a leaf. That lower soil will grow nothing, but a thick woody leaf, with large prominent veins, and such you do not want. The plant should be furnished with an abundance of those small surface roots, and these should be set out in surface soil.

The plant bed should be placed east and west, and a barricade of boards should be put up along the north side, to shelter it from cold winds, unless it

is made along the south side of a building or other structure, which is better. One large tablespoonful of good seed is sufficient for 150 square feet, or say a bed thirty feet long and five feet in width.

Having now done your work well, so far, you must not relax your vigilance. The bed must be covered with some substance that will keep the surface from drying out, and protect the germinating seeds from cold winds. I have used marsh hay for a covering, and it has answered a good purpose, and is free from seeds, but it is some work to put it on and take it off; old carpets will do, so will corn stalks. These all cost nothing, but the best covering is cheap cotton cloth, sufficient length, doubled to cover your bed, sew two edges together, tack a thin stick to each of the other edges; your cover is now ready for use. That your plant bed may be protected from too much sun and drying wind, and at the same time prevent the freezing, which would destroy the germinating seeds, there should be a space of from four to six inches between the cloth cover and the ground. This air chamber will be always warmer than outside, and will retain the moisture, so essential in the surface of the bed, especially until the seeds are well sprouted, and until such time the cover should be kept on the bed, excepting when a warm gentle rain falls it may be removed, and allow the bed to be well wet down, when it should be again covered; and this practice should continue until you can see that they are getting hold of the soil, when the cover should be removed permanently, only to be put on when a frost is impending, or threatens frost. The bed at such time should be covered without fail, as a frost would destroy your entire work. To put the bed in good shape, to be well protected by this cloth covering, place some common fence boards on edge along the sides, and across the ends of the beds; a few slight stakes, driven in the ground, will hold them in place. Then lay your cloth along on one side of the bed, the sticks to which it is tacked resting on the pieces of board at the end of the bed, and supported in the middle by a short board laid across the bed, and its ends resting on the side pieces. Then carry the other stick, with its edge of the cover, and place it on the other side; roll your stick, and draw your cloth straight, so that it shall not sag down upon the bed. When you wish to expose the bed to the sun or rain, carry one of these pieces across to the other side, rolling it so as to gather the cloth up from the bed. Such a covering will last several years, if taken up when done using it, and put away carefully. If the surface of the bed should become dry at any time, before the plants are well up, sprinkle it with water that has stood several hours in the sun, and put on the cover, and continue to do so every day until a shower of rain shall relieve you from that duty. The plant bed may now be left to take care of itself, excepting in the contingencies mentioned, and being on the alert for cold nights.

PREPARING THE FIELD.

After plowing, and dragging the tobacco ground, there intervenes a time in which you may plant the corn and potatoes, or do other work. About the 20th of May, again plow the tobacco ground, and drag it well until it is mellow, and the chunks are all broken and fine; put on the roller or any other machine, and work it until there are no lumps remaining. It will be remembered that we have placed our field on new soil that has never grown tobacco, and it must be well civilized, before tobacco will take kindly to it. What I mean by civilizing it, is to work it, and stir it with plow and drag, and other implements, until the sun and rain have touched all its particles; for it is upon them the plant must feed; it can get nothing from ugly lumps lying about the field. Having done that work in a thorough manner, you must now consider this proposition: If the land upon which you have placed the field is naturally rich, or has been made so by wash from other fields, or from your judicious management of it, and you have manured it, as I have advised, it will grow and mature a large crop of tobacco; the stalks will be large, and the leaves long, and in that case your rows north and south, should be wide apart. Under all those circumstances, those rows should be thirty-six inches apart, and these should be crossed by rows running east and west, twenty inches apart. The rows must be straight, even at the expense of much time and trouble, as such care will be more than compensated by the ease and facility it affords in cultivation, besides the damage which is unavoidable to plants standing out and in from their row. The straight rows will also afford you pleasure, whereas the crooked ones are a constant irritation and annoyance. If your soil is not so rich as all those conditions would warrant, and you propose to grow Spanish, I should plant north and south rows thirty inches apart and twenty inches the other way. There are many reasons why this plan is best; it is no object to place your rows so close that you will be compelled to stop the cultivator when the crop is only half grown, leaving the remainder of the cultivation to be done with the hoe, which is too slow and costly. By planting in the way described, the cultivator may be run both ways. The narrow way until the plants have reached good size, and will themselves do something towards keeping the weeds down, say about three or four times; and then stop cultivating that way, but continue it the wide way so long as you can get a horse and cultivator through without damage to the plants. This ought to be up to about or near the time of topping, as when that is done there will be a very rapid growth of leaf, and the hoeing must be done with great care to avoid breaking the leaves, and the cultivator must be laid aside. If the rows are too close much damage will be done while suckering, which is unavoidable, as the workmen must pass between the rows, and the tobacco will also lack body, and be deficient in gum, although it will be fine and silky. If planted too open, it will be thick and heavy, with prominent veins, but will have good body and plenty of gum, and weigh well when

stripped. A little experience will enable each careful grower to settle all these questions very nearly to his best interest. I have seen a field prepared in a very handsome manner, by running the desired rows, with a plow or marker, and the men with hoes crossed those lines at the width desired, and made the hills the other way, measuring by the eye as they reached each line, and the work was nicely done; but they must be practiced and careful men who do it. In any way that you can secure the best and straightest rows, now proceed to make a small hill at the point where the lines cross, bringing into it about two or three times what an ordinary hoe will bring, making hill about three inches high, and pressing it down with the back of the hoe. This will make the hill plain to be seen, and prevent its drying out. Be careful and keep all lumps and straw, and stuff of every kind, out of the hill, for the plant will only catch quick, and thrive when well planted in clean soil.

The hills being well made, as directed, you are ready to begin transplanting, when your plants are large enough to be drawn, and in the next chapter I will point out the way that I have found to be the best to plant tobacco.

Chapter II.

The transplanting of any kind of transferable plant would not seem to be a difficult thing to do, and yet there is much of that work badly done. There are but few parts of the work of growing tobacco that will better reward good judgment and care, than planting of the field. It is of first importance to have the plants even, as to size and in the quantity of roots, so that when all are equally placed in the soil, they shall all start together, for if large stocky plants are placed along side of small weak ones the latter will surely be left behind and the field will be uneven. The plants then should be carefully lifted out of the bed, leaving small and weak ones to harden and stock up, which they will do in a short time, after the bed is thinned out. The best way, I have found, to take plants from the bed is to drench the bed well with water; this will loosen the roots, and the plant may be lifted out easily and quickly by taking it between the thumb and fingers, close to the ground. The roots are not broken, but come out whole, and being straightened out, are in good position to place in the hill. If there are places in the bed where the plants are very thick together, they should be first thinned out by drawing the best and putting them in the field. This will give the beds a start, and the growth will be rapid, and the spindling plants will soon be strong, and ready to take their places in the field. The beds should be ready to yield a good supply of plants by the 25th of May, and you should be ready, and know where your help is, so that when a shower of rain comes you may make a beginning and put your beds in good condition for more extensive planting. If you do not get showers in the last week in May, I advise that you pull the largest plants, and set a few hundred every evening, even if they are watered in. In that case the bed should be sprinkled, where you have lifted plants that the soil may be carried back to the roots of the plants, where it has been disturbed. If your curing house is in the field, or adjoining it, your first setting should be near and about it, as those plants will need to be first cut to enable you to move about the building.

Such a plant bed as I have described, will furnish 15,000 plants by the 10th of June. If you plant the close way, which I have described, it will require 7000 plants to the acre. To be sure of having a plenty of good plants, you should have one such bed, for every acre that you propose to put out. If you plant the wide way, it will require about one thousand less. When the shower you have been looking for comes and wets the ground, then gather your working

force for planting. Set the most careful and pains-taking one of your help, to pull the plants, as they are lifted, care should be taken to let all small ones remain in the ground, if as often happens, small weak ones are taken up with the large ones, they should not be taken to the field, but should be thrown away, otherwise some of them will get in the hills. As I have already described the way to pull plants, I need only add that the plants should all be laid straight, in a common market basket, which is handy for that purpose, and also to distribute from; the tops should be all one way, and the leaves kept clean, and not broken. A careful boy can drop them, one plant to a hill and take three rows, and the setters should follow him at once, and set them in the ground. There are certain principles that ought to be observed in setting out tobacco plants. First, the plant must have a good hold of the soil, if not it will tip to one side or the other, and will be bruised and torn by the horse and cultivator, on the other hand if too deep, with a long root, all its growth will be from too low a stratta of soil, from which a fine leaf cannot be grown. If the hill is well made there need be neither of these extremes. The long tap roots, if any, should be pinched off to two or three inches.

Take the plant in the left hand, with the three fingers of the right hand make an opening in the center of the hill, about an inch deep, place the root in this opening, and press it down with the finger into the soil this should bring the plant erect where it is to stand, with the base of the stalk a little above the surface. Then put fingers of both hands in the soil, near the plant, and press the soil downward hard, and press lightly towards the plant. This will carry the crown a little below the surface, where it should be. Do not disturb the soil more than is necessary, for these movements. Having, as it were, grasped the ground enclosing the plant, with the fingers of both hands, give it a quick pressure downwards and leave it. I am satisfied from long experience and observation that this is the best way to set, to insure a quick start and firm hold. The practice of running the finger down in the hill to make a hole, and working the long root down into it, is altogether bad; sometimes a sharp stick is used for that purpose. You may depend upon it, that a large proportion of these holes are deeper, than those who make them think or intend, and the lower part of it is not closed, and the root is swinging around, in a vacant place, and not touched by any soil. It will further be found that the plant, while being loose about the bottom of the root; where it should be tight pressed, is pinched at the crown, where it ought to be free. Plants set in such a manner, may struggle along, and perhaps if it is favorable weather, may survive such treatment and live, but the chances are against them. Upon entering upon the work, the owner should call together those who are to set plants, and show them how to do it well, and watch their work, and see that it is done as he directs; follow the setters, and take hold

of the leaves of plants, and see if they do not come out of the hill by a light pull upward, if they do, the person who so places them should be sharply rebuked, and if persisted in, should be sent out of the field or put at other work.

Finish the planting, and go in the tobacco field with a good horse, and a cultivator with eight or ten small shovels, and run between the rows first, the wide way. Do not go too close to the hill, as the plant should not be disturbed; having gone through both ways go in with hoes. This work requires great care and should be only surface work, about the hill, to loosen the crust, and bring a little fresh dirt, to fill any cavities in the hill, and you will find that the plant will promptly respond, if you do it well. Having finished the hoeing, the field may be left for a week. At the end of that time, their fresh and vigorous looks will indicate that the plants have got hold of the soil, and thenceforth their growth will be rapid; and once a week the field should be cultivated, and after the second cultivation should be again hoed. After that your cultivation will most likely be confined to the wide rows. The hillers should be put on behind, and run close to the hills, moving the soil close up to the plant, and turning up and covering the small weeds. If a heavy rain should come, soon after you have been through the field with the cultivator, so soon as the surface is dry enough, the field should be again cultivated in order that the air and sun may reach the soil all about the plant roots, which they cannot do if a crust is allowed to form over the surface of the ground, which will be the case with most soils.

After the first cultivation the tobacco worm will put in his appearance, and they must be hunted diligently, and exterminated while they are small, as they are voracious eaters, and begin their damaging work early. They will be found on the under side of the leaf, and are so near of the color of the leaf, that it requires sharp eyes to see them; bright active boys or girls, ten or twelve years of age, are good help at this work, if in charge of an older person to direct them.

Chapter III.

TOPPING, SUCKERING AND CUTTING.

There is a great variety of opinion as to the best time to top tobacco, reference being had of course to its growth. Among the intelligent growers there is now but one opinion, as to topping high or low. It is now top low, and that point may be considered as settled. During the years that I was growing seed leaf, I considered the subject carefully, and tried experiments in topping different plants, that were apparently about equal in growth and maturity, taking the tops from some plants just as the top was well out, topping others a week or so later and still others after the blossom was out. There was not the difference in the time of ripening that I expected. The plants topped after blossoming, did not seem to make so much growth of leaf as those topped earlier. The latter grew large top leaves, larger than any to be found on the late topped, but the most notable difference appeared after they were all cured out. The early topped plants had leaves that were much more elastic than the late topped, had more gum, and were equally as fine in texture and color. Reason, analogy, the law of plant life, support the theory of early topping, and I am satisfied it is best. To indicate to a new beginner, just that period, is not so easy. When you stand at the side of the field, and looking over it, distant as well as near to you, and see on all sides that the heads are out, then begin your topping; probably in that part of the field where you set first. This is the best description which I can give of the proper condition of the field, and I believe the beginner may act upon it without danger of making a serious mistake. About twelve to fourteen leaves should be left to mature, not counting the small sand leaves, near the ground; they should be left in the field. That is a good field of tobacco, in which every stalk yields twelve ripened leaves. A very strong heavy plant will mature fourteen leaves, but it will be found after all are cured that the two top leaves of the latter plant will not compare for fineness with the leaves of the other plant topped lower. Speaking in a commercial sense, the twelve leaves of the one plant are worth as much money as the fourteen leaves of the other plant. The grower can draw all needed inferences from these facts. The persons employed in topping should crush the bud which will appear at the base of the upper leaf, this will set back, and retard the growth of a sucker, at that place. These suckers will push forward, at a rapid rate, after the tops are broken, and diligent work

will be required to keep them broken off. They must not be allowed to grow as that will lose you all the advantage which was sought in breaking off the tops. Be careful and put the broken tops and suckers on the ground and not on the leaves. During all of the work of suckering and topping, as well as in the hoeing, one point should be steadily kept in mind, that is to kill worms. It is bad policy to wait and find them by the aid of the big holes they have eaten in the leaves. It is better to extinguish him when he is small.

HARVESTING THE CROP.

When your tobacco is ripe, it tells you almost in words; and yet some experience is needed, in order to understand its language. If you take a green leaf, fresh from the stalk, and only approaching its maturity, and place it along side of a leaf fully ripe; an intelligent person, unacquainted with tobacco, would have no difficulty in selecting the ripe leaf. The ripe tobacco leaf then appears ripe, and when I have indicated a few points in the appearance of the leaf, which always accompany that condition, the new grower has all that can help him except actual experience. Your field, planted by these rules, if it has done well, about the middle of August will put on a matured look, which a farmer, used to observing the phenomena of nature, cannot wholly mistake. The ripening will begin at the point of the leaf; if you raise that up with your hand, you will discover a roughness of the leaf at the point, and diverging each way, along the edge of the leaf; and pale yellow spots, or a fading out of the green, will be found in this rough surface, and the whole leaf will appear mottled, and thickened. These are signals for you to put your house in order, and be prepared to take the crop into the curing house.

CUTTING UP THE CROP.

The cutting down of green tobacco stalks, with an axe, may seem to most persons to be very easy, and therefore a very proper thing to do. The work, to such persons, would not appear to be very much different from cutting up corn stalks, and so many well informed tobacco growers use about the same implement for cutting up both corn and tobacco, and often the two crops are handled in a manner very similar. If an inexperienced person, of a clever and thoughtful turn of mind, were to be informed that the money to compensate the farmer for his outlay upon the tobacco crop must come, if at all, from the sound leaves, all other leaves not more than paying the cost of handling after curing, he would be likely to say, without much hesitation, that the present practice most in vogue, of cutting tobacco with a small axe, is as coarse and unskillful as could well be devised. It is not possible to carry on that kind of work in a tobacco field, without great damage being done to the tobacco. The swinging of those chopping-hatchets in the midst of the standing tobacco is an incongruous spectacle, to say the least, and when we remember how the leaves spread out on every side and cover the ground, and how easily they are broken, and that holes will be found in spite of the greatest

care, the sight makes one shudder; for it is well known that the tobacco field is full of imps of one form or another, to do plenty of damage, and it is strange that a tobacco grower, knowing these things, should thus re-inforce these imps by an organized raid of the kind. I used these hatchets for a time, because I read in a treatise on tobacco growing, that they are the best implement for that purpose, but I abandoned them, for I saw on every hand the mischief they did, even if the blow was not intercepted by the leaves, the shock rarely failed to break or drop one or more.

The very best tool for cutting tobacco is a small, stiff-backed saw about ten inches long with fine teeth. The reasons why it is the best are numerous, but it will be sufficient to state some of the more important ones here. The saw being held in the hand, when not in use, is dropped down close to the leg and when used is never raised up, but slips from its place, under the leaves and never through nor amongst them. It is then turned flat wise, close to the ground, and the motion in cutting the stalk is too slight to even jar the plant; four inhes of the saw blade will cut off the largest stalk. The saw comes back to its place under the leaves. When the stalk is cut a careful hand must lay it down upon the row where it grew. This is the way the saw is used in my field. Going to the side of the field opposite the wind, take hold of the stalk, about one-third the way down, and press it a little to the left. Don't ram it into the other row, nor wrestle it around, but press gently, so as to give the stalk a slight spring; a very light push then on the saw will carry it through the stalk. Don't drop the plant, but lift it gently away from the other plants, carry a little to the rear and, with a quick motion forward, to straighten out the leaves, lay it down, butt towards the field, this will leave your plant with the leaves all straight, instead of being doubled up and crushed, as is too often done. Don't run the saw in the ground, but lay it flat and cut close to the surface. All these movements are slow and methodical, as they should be, in the tobacco field. The stump being cut low down and square, there will not be any sharp points or jagged edges to pierce the plant, as it is laid down; besides it is easier going about the field. It is well known that the slant cut of the hatchet always leaves a sharp stub above the surface of the ground, upon which the leaves of the cut stalks must lie. They can't help cutting and piercing the leaves. If, to avoid leaving that sharp stub, the operator aims his blow lower down, he makes it worse, for then the axe will strike the bottom of the stalk, which is nearly as hard as oak, and two or three blows are necessary to sever it; and often then the stalk comes off, with pieces of broken stalk and roots, which will continue to do damage, until the leaves are taken off, and they are thrown out doors. This kind of rough work, in the field, will demoralize the force at work, and it will not be possible to enforce the needed care on their part, and finally the grower will himself become demoralized. There is a theory of cutting tobacco with a hatchet, so as to avoid the damage and injury I have mentioned, but the practice is widely different, as thousands of tobacco fields can attest.

Chapter IV.

The practical details of growing a crop of tobacco were brought down in the last chapter to the tobacco cut down and lying upon the ground. In the present chapter will be discussed the best way to hang tobacco, reference only being had to hanging on sticks or otherwise. The matter to be discussed being connected wholly with the curing of the crop, makes it the proper place to bring forward my new tobacco curing house and present it to the tobacco growers. I do this with pleasure and the greatest confidence that it will vindicate all that I have claimed for it. This tobacco curing house is not resting on mere theory or abstractions, it is a practical thing, resting on a sound base of science and only obeys and makes available those natural laws which are invoked to aid the work of curing the tobacco, but which are nullified by the bungling contrivances of what are called tobacco sheds, and all the theories upon which my curing house is designed and planned are strictly in accordance with all the natural laws of plant life, and those climatic agencies, upon which we rely to perfect the work of curing tobacco, and the actual tests of its work, cannot be set aside, by ancient practices however venerable. I have thought it best, with a view to a clear understanding of what it is, that we propose to do with our crop of tobacco, to explain my views of the plant, and what is needed in a perfect curing house.

THE CURING HOUSE.

In order that it shall be worthy of the name, it ought to embody principles which have something to do with the work. It should not attempt to overcome the forces upon which the excellence of its work depends, but to work in harmony with them by its appliances and fixtures, thus making all conditions of climate do its work. A building so planned and constructed will not leave the grower to be baffled by fickle changes of wind, or adverse climatic conditions, but compels them all to aid him in bringing out the best results possible with the crop stored in the building. Armed with such appliances, his intelligence rises superior to all conditions and controls them. When the dangers of the growing and harvesting season are passed, the tobacco grower, so sorely tried, ought to have rest and not be driven to frenzy by the terrors which breed in the curing house, supplementing his summer of toil and anxiety with fearful days and sleepless nights through the agony of the curing season.

This has been too long the experience of all tobacco growers. Happily for him all seasons are not bad, but his anxiety is the same, and nothing can rid him of it, excepting he is armed and equipped for whatever may come.

In the domain of agriculture the tobacco grower becomes in an acceptable sense a fine worker. More than any other must he have a quick sense of all those mysterious laws to which he appeals, and he must keep himself and his efforts strictly in the path which nature travels, and not depart from it. Nature does not bungle her work, and she will toil side by side with the true and devout in spirit and bring the fairy fingers that will fill out the work for them with delicate texture and paint it in gorgeous colors.

The following propositions, which I lay down, ought to be axioms with the tobacco grower:

1st. The tobacco plant ought not to go into the cured state before it is thoroughly ripened.

2d. Dried tobacco is not necessarily cured tobacco, not even if it has taken on color and responds to changes in the atmosphere. Its body is green and must remain so, to the loss of color and quality, hence follows:

3d. The tobacco leaf should never be allowed to dry or shrivel up, until it is first ripe, then cured, because the green leaf once dried cannot be restored to its former condition. It cannot resume the ripening process, which has been arrested, but it must remain green.

The drying of the leaf means also a drying of all the sap in the leaf. All the channels through which the leaf receives sap from the stalk and stem are by this drying closed up. Thereafter there can be no circulation and it is of no avail that the leaf may be softened by a damp atmosphere: it can go no further than to slightly improve the color. It is well understood by growers that when the tobacco plant is cut down it is not ripe, but only begun its ripening. It would be impracticable to leave the field standing until the plants were wholly ripe, and that is not desirable if it could be done, because the ripening process, fairly underway in the field, can be better completed in a properly constructed curing house. The plant then, when taken to the house, is full of rich sap in the stalk, stem and leaf in full circulation. This sap, the very best of its whole growth, is rich in all the elements of gum, aroma and color, and the perfection of the leaves requires it all. To arrest this circulation, at about midway of the curing, is a gross violation of natural law, and the result is a green-dried leaf with hard, woody veins. The blade of the leaf will be shrunken, and thereby all the veins are strung with hard little kinks, that even a very high case will fail to soften. The curing of the tobacco leaf is a natural process, not an artificial one. Like its growth, it has all necessary provision for that result, if not baffled by the meddling and awkward contrivances of man. The leaf so having reasonable treatment, itself puts on its gorgeous, high-tawny color; its fiber is strong, fine and elastic. The veins will be matured and cured precisely as the blade is cured. They will have what

may properly be called a finished appearance, being compact, smooth, glossy, and soft, and are pliable in any condition of weather that will soften the blade, and will mainly be of the same color, sometimes a trifle darker than the blade.

Although I might rest my third proposition here, I cannot forbear going a little further with this subject, as it will be seen to be of vital importance. The curing house makes about the same difference in the cured leaves, as the planting and soil and cultivation will make in the green leaf, for all know that a highly manured soil, well cultivated and kept warm and mellow, will grow a finer leaf than a new, rich, untamed soil with slack cultivation, the growth then being open to these several conditions, influencing and governing the quality of the product. So with the curing of the leaf, for both are natural processes and require favorable conditions in one case as in the other.

I have said that in the cut tobacco stalk there are all the elements of beauty, fineness and rich aroma. There is also in the same stalk all the elements of sourness, heat, poison gasses, rottenness and decay. When man takes the plant from the field into his custody, and attempts to direct the influences which are to crown his work, he should see to it that he conforms to natural laws in his treatment of it. The vegetable, like the animal, is susceptible to the poison of bad gasses and foul air, and, like the animal under it, will lay down and die.

4th. Taking the tobacco stalk with all its possibilities of beauty and value, and of rottenness and decay, it is man's duty and interest to see that the outcome shall not be a matter of doubt and uncertainty, for man's intellect ought to dominate simple natural forces and make them serve his purpose.

5th. A current of air ought not to be allowed to pass through the hanging tobacco, except for a few minutes at a time, and then at such time and only in such manner as shall be necessary to change the air in the curing house, and only for that purpose.

Having already said as much as I care to say at this time upon the 4th proposition, I proceed to give my views upon the 5th proposition, and the reasoning on which I rest it. I do not forget that this proposition is a direct attack upon the opinions and methods of the great body of tobacco growers, many of them with years of experience in growing and curing tobacco. The methods of men of course reflect their opinions on those subjects; but there is much yet to be learned about all human affairs, and one thing learned means the overthrow of some one old idea that when once cast aside men look at it with shame and humiliation that it had been allowed to control them so long. In other words, when men see a new and clearly a better way in any of life's affairs, they are struck with astonishment that it had not been found out before.

A tobacco curing house will always be full of air, make it so tight as is possible. The air will be there, no matter what else is in it, and that is all the curing tobacco requires. But in a building full of green tobacco, there is an enormous quantity of poisonous gas, thrown off from the curing mass, so much so, that to enter and remain a few minutes in such a place would endanger life. In a properly planned curing house, there will be a way provided by which this foul air may be quickly taken out of the building, and its place supplied with fresh, pure air from outside; but neither in carrying off the bad air, nor admitting the fresh, should there be a perceptible current in the building; and in the most critical stages of the curing, the change should be made in a few minutes of time. A current of air through the building thereafter only makes damage and loss. We have seen that the stalk is filled with sap, which it is desirable shall be utilized in finishing the texture of the leaf, coloring it in its own native hues, and laying in the ripened and cured gum for its delicate aroma; some of the constituents of this gum are volutile in their nature, and the valuable part of it will escape in the current of air, if it is allowed to course freely through the building. These constituents cover the leaves with that beautiful gloss, which is so much admired; if allowed to be absorbed from the leaves during the curing time and carried off by currents of air, the leaf, however fine its texture and color, will be paperish to the touch and unyielding and wholly wanting in style. In flavor also it will want the substance and aroma which only the gum, which has been carried away, can give it. The loss in weight would be imperceptible to the senses, but if growers could see the aggregate of pounds of the richest part of the tobacco, which is carried off by the wind having access to the curing tobacco, they would be startled in every section where tobacco is grown. It is well known that in all uses and places a current of air means absorption and drying, and that is a sufficient reason why it has no business in a tobacco curing house, for we neither want the juices in our tobacco plants absorbed or dried, but rather we want it there to fill out the place intended for it and so finish the economies of nature.

In tobacco journals published at several tobacco centers, the question of how to cure tobacco has been well discussed; and many ideas of great value to growers upon this question, have been promulgated; but in all that I have ever seen written upon that subject, there has been a lack of discernment of the true principles underlying the subject, and a failure to grasp all the theory and the details, and the writers make it painfully apparent that they realize there are mysterious forces which they do not comprehend, and not feeling sure of their footing, dare not grapple with them. Hence they teach in generalities, avoiding as far as possible explanation, and putting questions that they do not understand out of sight. The scholar goes just so far as the teacher goes, and learns in course of time, that the whole business of growing is frightful with doubt and uncertainty. It is possible that the Creator might have established a way and manner whereby the secrets of na-

ture might be easier found and brought into man's use with less of toil of brain: but we know that he has not, and we also know that it is best as it is. So man must proceed with his work, and grope and stumble, but he may be compensated if he will come close to nature in the home where her fairy workers abide. These teachers of whom I have spoken in the respect of ventilating the tobacco shed, advise that the shed be not opened too much, lest the wind dry the tobacco too fast or break it when dried or throw it off the bearings, or do other damage. They speak of what they call the critical time when the tobacco grower must have nerve to carry it to the outer verge. This is understood to mean the time between the ripening or maturing of the hanging plants, and the change of color which will begin soon after: and the idea is to hold the plant in that condition and compel a slow coloring, with a view to the complete circulation of the juices of the plant through the veins and blade of the leaf. The main idea is correct, but the application of the principle ought to begin when the plant is first hung in the curing house. Some writers call this holding back a *choking process* to force a high color in the leaf. The chief fault to be found with this is that while it aims after desirable results, it is misleading and far short of an understanding of the true way to reach them. As has been already shown, the ripening and curing are natural processes and do not require any extraordinary nerve. Neither do they need any choking process nor holding back, except such as should be applied to the entire term of curing. To say to the grower, as some do, that he must have courage to hold his tobacco up to the verge of damage by rot or shed-burn before he lets it off into full color if he would have rich, high color in the entire leaf is erroneous as to the nature of the influence at work and misleading as to their management.

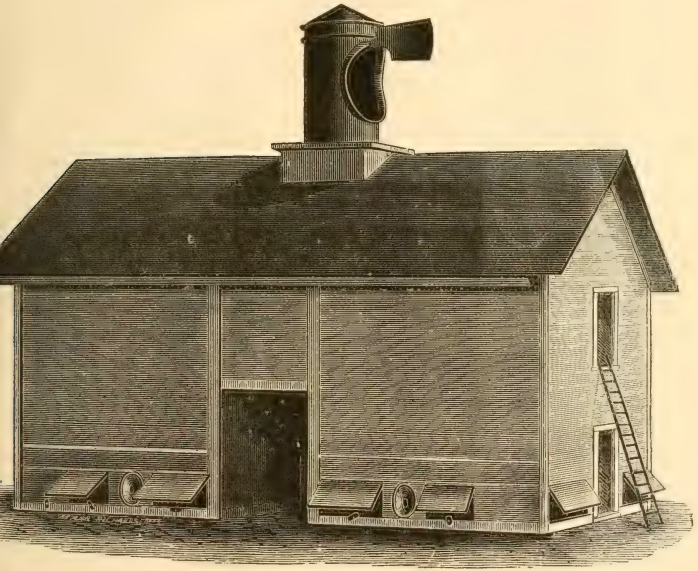
These writers upon tobacco culture have done much to advance the work and improve it. They have gained glimpses of the curious processes in the putting on of color, but they stop short of making a full discovery, and I am persuaded that the ideas of proper curing of tobacco, as presented by them, discloses more their aspiration and knowledge of the want of better facilities for carrying out correct ideas. That is, they have made better progress in a knowledge of what is desired than in the applicances devised to bring it about.

I have, therefore, the greatest confidence that all such persons who are advanced in the culture and curing of tobacco will be the most ready to see the adaptation of my plan and the certain facility which it will afford, to bring the art of curing tobacco up to what has long been desired.

At the present time I will say nothing more upon this subject of curing tobacco, as in that part of the work, in which I bring forward for illustration, my new curing house, I shall have occasion in explaining its appliances, fixtures and various devises to speak more in detail on that subject, in connection with the parts of the plan, which take in the curing for their intent and purpose. In a plan of machine, which has to deal with the effect of the elements

upon organic forms, it must, in the nature of things, be rested upon theory and abstract mutual laws, and I do not hope that these are so well and universally understood, as that there will not be persons who will be sceptical about such an innovation upon old and venerable methods; but that can only take us into a field, into which I am more than willing to go, that is a critical examination and test of the work done, and there the whole claim may safely rest.

THE NEW TOBACCO CURING HOUSE.



The unit of my tobacco curing house is a building, sixty feet long, divided into two sections of twenty-four feet each, and again these two sections are divided into two divisions of twelve feet each. The building is 33 6-12 feet wide, four tobacco stories high and has four tiers of 4 feet in width each side of the center walk, making eight tiers in all. In the center, between the two sections is a driveway of twelve feet, fitted with movable bearings and doors moving upward on pulleys at each side of the building.

Midway between the second and third stories is an inspection walk, eighteen inches wide, extending the length of the building, with a door on each

end for entrance and exit. This walk is of inch boards, six inches wide, twelve feet long, and each end of every section of it rests upon the girders hereinafter described. The walk is built by placing the boards edgewise vertically, the two sides are shouldered to receive the ends of the sticks on which the tobacco is hung, by using a piece of one inch by $4\frac{1}{4}$ for each side piece, the intent being to have the upper surface of the lath, when hung on the bearing, even or a little below the general surface of the walk, so that they will not be moved or disturbed by the inspector when passing along the walk. If it is desired, the walk can be made wider by adding the proposed additional width to the width of the building. This walk will be found an admirable feature of the curing house, as it affords to the grower an easy facility for careful examination of the way the curing is progressing, and of any change that is needed. This means of learning the exact condition of the curing tobacco, being so easy and certain, will be appreciated by growers, when they remember how difficult it is to inspect the sheds as now constructed. It is true he can go along the outside of the building, and learn that it is green drying, but he will not be able to avoid a presentment, that in the center of the mass it is burning or rotting and he can only wait in doubt and fear, until the mischief has culminated. Knowledge of what is transpiring in the curing house is of the first importance to the grower, and it ought to be as certain and easy to obtain as the knowledge of the condition of the growing crop. In the absence of such knowledge, his days and nights are tormented with fears, which make the business a great burden. This walk is thus suspended between standards, which rest on a sill and support the rafters, in the midst of an air chamber, which opens into the roof ventilator, which will be described, and connects the ventilator with the base air chamber below the hanging tobacco, which will also be described further on in connection with the roof ventilators. This vertical air chamber, extending from the roof to the ground, has an important office in the curing house, and that there shall be the least possible obstruction to the passage of air during the curing season. This walk is made open by placing blocks two inches thick and of suitable length between the boards, about six feet apart; this leaves vertical openings in the walk, through which the air passes freely, up or down, as may be required. The superstructure of this curing house rests upon a base two feet high from the ground on sills, mortised to posts, set three feet in the ground, and is covered with matched or ship-lapped boards from the ground to the roof, and all knot holes or cracks are battered and made tight, and there are no ventilating doors in the body of the building.

THE VENTILATION.

The system of ventilation with this curing house consists:

1st. The air chamber two feet beneath the hanging tobacco.

2d. The vertical air shaft in center of building, its whole length.

3d. The air distributors in each section of the curing house, with their pipes connecting them with the funnels outside of the house.

4th. The rotary turret on the roof, with its double vanes for upward or downward draft.

5th. The arresters to be hung in the center of each section to force an upward draft.

6th. The outside ventilating doors in the base to convey air into the base chamber.

7th. The inside ventilating doors for special and local use, as will be hereafter explained.

The construction and manner of use of these several devices I now proceed to describe:

The air chamber in the base receives the fresh air from the outside through the base doors, whenever there is occasion for it, but not otherwise. This chamber, having no obstruction, will be always full of air, which can be made active and caused to circulate upwards through the hanging tobacco by opening the throat of the revolving ventilator. The current of air then passing over the building, creates a strong draft from inside the curing house. But this current is by no means to be kept up, only for short spaces of time as has been shown, after the foul air has been carried out of the building such a current of air does only damage. Currents of air otherwise perform no good office in a curing house. Upon entering the curing house, if the odor is strong, the air heavy and offensive, open the throat of the turret slightly, and at most times the draft upwards will, in from five to fifteen minutes, clear out the bad air so completely, that any person may go through the building without inconvenience. Curing tobacco requires a pure, warm air, not too dry. With this plan of curing house it can scarcely ever become too moist, as whatever moisture it takes will be evenly distributed and no part of the tobacco being exposed to heavy wet drafts or currents of air, in no part will the case be too high, while artificial expedients must often be resorted to in order to temper the hot, dry air. Cured tobacco will take care of all the moisture that comes to it evenly and naturally distributed in the atmosphere, but tobacco exposed to dashes of wet currents of air, will take on black spots, that permanently soil and stain its surface, and immense damage is done to the crop by such exposure. With this building there is no possibility of such damage, as the wind, either wet or dry, never strikes against the tobacco.

The system of ventilation, through the air stored and toned down in this base air chamber, is so reasonable and natural in all aspects that I might leave the subject here, trusting to the judgment of tobacco growers, for their verdict in its favor, but there are some things, as matters of illustration, which it would seem proper at this time to mention. Take a stalk of green tobacco and hang it up above your head, top downward, now step beneath it and notice the manner in which the leaves shape themselves into neat little fun-

nels, in which the air may enter and proceed upward along the stalk and stems. Nature could not more plainly write out instructions for hanging tobacco than she has, almost in words, pointing out the manner in which the air should lead directly to the points, where fester and breed, sourness, rot and decay; and from this base air chamber all and every plant in the curing house is sure of a supply of pure air, conducted to its place by nature itself.

POLE ROT.

In pole rot the fiber of the leaf is destroyed, vitality is lost and the leaf crumbled to ashes or mould, instead of curing. If the causes which produce rot are sudden and very active, the leaf will rot at the base of the stem and fall to the ground. There are no direct and intrinsic causes of pole rot in the tobacco itself, except as I have mentioned. The fine and delicate leaves, which are the valuable ones, are more susceptible to it than the course, strong leaves, for the obvious reason, that being more tender, they yield easier to the foul air and crowding, which are chief causes of pole rot. Such tobacco requires greater care in spacing on the lath and placing on the bearings, so that it shall not be pushed and crowded; and also that the fine, thin leaves are not left clinging to the green stalk, for although the circulation coming up under the leaves will generally lift all such leaves that cling, it is better that the workman see to it before the lath reaches the upper stories, that it all hangs free and clear. Pole rot then is mostly chargeable to the careless and unskilled work of the grower, through which he loses the most valuable part of his product, as his thick course tobacco can stand a great amount of ill usage.

SHED BURN.

Shed burn comes from too long holding back for the purpose of high color, but may come of careless placing of the tobacco. The tobacco, instead of beginning to ripen and cure, begins a new growth, the leaf puffs out and thickens, and seems on the point of bursting with a surplus of sap. If a current of warm, moist air can be turned into the mass before it has gone too far, it will come out a fine color and strong texture with beautiful dark veins. If that unnatural condition continues too long, the leaf may retain some color, but its life and elasticity are gone, not to be restored. It will be hard and stiff and will not go into case, and breaks and crumbles when handled. Pole rot will of course add its mischief to the result when the causes for it, which I have described, combine with other causes.

WHITE VEINS.

There are several theories respecting the cause of white veins in tobacco, and experts in tobacco culture and curing do not agree about it. They are liable to steal upon the grower unawares and when he has felt himself wholly secure from them. They are a curiosity in themselves, and nothing, so far as

now known, can be proved against them. Whenever they make their appearance in wrapper leaf, it must take a step down in grade, so that this one thing is well known of them, they cause the grower great loss. It often appears in short sections of the veins, other parts of the same veins being sound and of good color. Without attempting to state any theory explanatory of such eccentricity, it may be that it would be caused by a check given to the growing leaf, by a short spell of cold weather retarding the growth by suspending the circulation of the sap, at the same time there would be nothing in the conditions to suggest an impairment of the texture of the leaf; and none would appear until the curing should bring the damage to view. It is a fact beyond any question, that a steady and uniform growth are essential to produce a perfect leaf, and it seems to me not entirely a guess, that a day or two of cold weather during its rapid growth should produce those spots of white vein to which I have referred. Some have attempted to account for white veins, by charging it to poor soil and a lack of cultivation, and I strongly incline to that opinion. Tobacco taken from such a field, where there has been no proper nutrition of the plant, and hung, fresh from the field, in the upper story of the shed, where it will be exposed to a hot atmosphere and the absorbing power of the heated roof of the building, will undergo, in a few hours, a great change. Circulation will be almost instantly stopped, after which there can be no maturing, but only a dried up condition, out of which will come white veins to torment the grower for his careless and shiftless methods. The true way is for the grower to make his field rich with manure and keep it warm deep down and mellow with the plow, cultivator and hoe during the growing season, and nature that does not delight in monstrosities, but assiduously labors for her children, will so round out and finish her work with his aid that it shall bring to the toiler joy and gladness.

The best result will come from planting early, so that the plant may have a vigorous start and be prepared for a rapid growth when the hot growing weather begins, for it must be remembered that the Havana Seed variety, which we have discussed, was originally a native of the tropics, and in our northern latitude it requires every hot day of the season both for growth and afterwards for curing, and to that end the planting should be early. Fine curing cannot be done after cold days and cold nights begin.

In this plan of curing house all the elements out of which come these three terrors of the curing process, are absolutely under the control of the operator, but in the last case the tobacco goes into the building with an inherited tendency to white veins, from which it may not be able wholly to escape. Pole rot and shed burn are not now masters in the curing house, they are subject to control, and with this building and its plan and methods, they are made impossible.

VERTICAL AIR SHAFT.

I proceed now to speak of the second item in the ventilation of the curing house. There are many seasons when the tobacco would seem to have nothing to do, but go right along with its business of curing. The weather, of both the days and the nights, are so mild and uniform, and good tempered, that everything seems to conspire to bring the curing through in the best possible manner. But such are rare seasons, as tobacco growers well know, the most common experience is that the elements seem to delight to baffle the grower; and, hence, a tobacco curing house, to be worthy the name, must be fully equipped, with all needful appliances, to control all adverse conditions; as one of the devices to aid that design, the vertical air shaft is erected in the building, from the ground to the ventilator on the roof. It often happens that during the season of cutting, tobacco does not wilt down easily in the building. Showers of rain stimulate a renewal of growth, after reaching the building, and the stems and leaves stiffen out, and take nearly their condition before being cut down. It is possible, that under stress of weather, some tobacco has been placed in the house, not much wilted, or perhaps damp with dew or rain. These of course aggravate all other bad conditions, and the strange spectacle will be presented, of the curing house being filled to suffocation, by two agencies, one is the hauling in of the green tobacco from the field and placing it with the expectation that in a few hours it will wilt down, and give room in the building, and the other is this swelling out and puffing up, strutting, as it is called, which more than fills the space allotted to it, and demands more room. These are not unusual conditions, they are very common, and in the natural hurry and anxiety about storms and to escape frost the shed is filled up, when all through the building there are masses of tobacco, that nothing short of a miracle can save from shed burn. With the badly planned sheds of the present day, the grower is helpless, although it may have doors extending from the ground to the roof in the entire building, no air can reach the middle of the mass, nor can it be forced through, so dense has it become. Now let there come a few days, or even one day, of hot, damp weather, when there is scarcely perceptible a current of air, but the whole atmosphere presses downward, and nothing can save such a lot of tobacco in such a condition, even to tear the roof off the building, would not help the case. The tobacco will rot down before the growers' eyes and he cannot help himself. Now what would my building do in this condition of the stored crop. I will tell what it would do, first premising that in the plan of hanging tobacco, presented and advocated in its proper place in this work, the conditions spoken of are very much less liable to arise, but when they do come, there is a prompt and speedy way to overcome them. The tobacco in that condition is perishing for pure air in a desperate struggle for existence, and the forces arrayed against it are too strong for it, and it must succumb.

It is a well known fact that if a current of air can be started in the mass, no matter what the direction, the tobacco is saved. So it is a common practice to have at hand some fuel or material with which a fire can be started in the building, to create a draft, and, in the absence of better methods, it is a wise thing to do. With that condition of things in my curing house, this is what should be done. Step into the air chamber and pull a cord which comes down to the ground, and which carries back the sliding door, which covers the throat of the revolving ventilator. If there is any current of air passing over the building, the draft created by it begins at once to draw the air from inside, and it is most likely so dense in a mass of four stories of green tobacco, that air cannot be forced through, but at the same time the air from the base chamber will readily respond to the draw upon it, and will freely pass into the vertical air shaft, as there is nothing in it to impede its way upwards. As the air begins to be exhausted in the air shaft, it will press more rapidly into it from the base air chamber, and into the latter from outside. It will be remembered that by my plan of hanging tobacco, the sticks of tobacco are suspended the narrow way of the building, one end of the lath, on both sides, resting on the walks; of course then the channels or spaces between the hanging sticks lead directly into the air shaft, and although the air could not be forced up or down directly through the mass, it can be and will be drawn out of the mass into the air shaft, and so out of the building. The draft up the air shaft will depend upon the force outside the building, if that is but slight it will require a longer time to draw the air out of the curing house, but it will move and will work an immediate change in the condition of the tobacco.

In the circumstances before referred to, when the air is hot and damp and presses downward upon the ground and on the building, the manner relief to be gained is not so simple, but it is equally certain. In that case the storm vane of the turret is to be lowered by pulling a cord which reaches the walk and the vane drops to its place in the turret; by pulling the cord attached to the downward draft vane it is swung up to its place, and the turret swings around and brings its open face to receive whatever current there may be; the sliding door, which closes the throat of the turret should be drawn and let wide open. The air will enter the ventilator, and press down the air shaft where it meets with no obstruction. All the base ventilators should now be fully opened, and the air in the base chamber will begin to move in some direction, of course we are indifferent as to which way it goes. The pressure down the air shaft, will soon be caught by the under base draft, and together will go out of the building. Whenever there is any movement in the building, the damaging process will be arrested. Whereas, by the plan of my building, the end of the stick comes to the side of the building and the spaces between the sticks are channels through which the air may pass completely round the hanging mass and into the vertical air shaft, making an admirable system of circulation and affording no corners or places where foul air can gather and remain to do its mischief. In the other plan these passages between the laths

of tobacco run lengthwise continuously the length of the building, and, it is very plain have no means of exit, except by ascending straight up through the several stories. There must at all times, in such buildings, be accumulated bodies of foul air all through the building ready at any time to put in their damaging work of shed burn and pole rot.

There are many other reasons in favor of this plan of driveway, which I omit. For the purpose of such sure and certain method of drawing foul air from the curing house, the plan of driveway in this building is the very best possible and much superior to the driveway lengthwise through the building, which brings the side of the whole stick of tobacco against the side of the building, and a healthy condition will take place. In operating the downward draft, it will sometimes happen that there is no perceptible current in any direction, but simply a downward pressure of the atmosphere, so far as can be observed, but I have always found the ventilator turning in response to some pressure and indicating a current of air above the building. The bearing on which the revolving ventilator turns at this season should be kept well oiled to facilitate its movement; but, as before stated, the outside pressure will make an entrance into the air shaft and fill the loft of the building in any case, and compel a movement in the curing house. The operator, by going about the building, will soon be informed by the strong odors that the movement has begun. It may seem to many persons that so simple a device cannot prevail over the obstinate, bad conditions, which are at work inside, but let all such place themselves outside, and near the building, while the operator is at the work, and they will be satisfied, very soon, that the plan is not only very simple, but easy, and the work well and quickly done. When the condition is made satisfactory to the operator, the storm vane should be raised and the other let down.

THE AIR DISTRIBUTORS.

The 3d item in the system of ventilation of this curing house, is the air distributors. This is simply a wooden box eight feet long, with end pieces, and eight by eight inches inside measure, with six slots, six inches long, and two inches wide in the top, and is placed in the center of each section of the curing house, on the ground, and close to the sill, on which the standards rest. To each end of this distributor is fitted one end of a conducting pipe, also made of thin boards; the other end of the pipe just reaches to the outside of the building, and to the end is fitted a funnel, made either of tin or thin boards, and should be from 12 to 16 inches across its face, and flared outside so as to bring it close to the side of the building. These conducting pipes should have an inside surface of at least four by four inches, and will rise a little as they approach the side of the building, in order to give room above the ground outside for the funnel. Each funnel is provided with a cut off, whereby the air may be excluded from the distributor, when not needed in the building.

THE PURPOSE OF THE DISTRIBUTOR.

Having wholly departed from the common way of ventilation of tobacco sheds, and brought forward what I claim is a more rational and sensible method, it will be expected that I shall explain the purpose and manner of using this new device.

Early in my experience of growing and curing tobacco, I found myself confronting a problem that was not easy to solve. It was simply this: The center of the mass of curing tobacco badly needed air, and although there were plenty of hinged doors on the building, and they were kept open, yet the center was in a dangerous condition from want of air. I also found that the outer tier of tobacco was being damaged by too much wind—was drying green, and was blackened by the wind and sun and rain. What the situation needed was some device whereby the outer tiers of tobacco might be protected from wind and sun, and still independent of mere doors, pure air from outside could be carried under the hanging tobacco where it was not needed and distributed in the center of the building where it was needed. This distributor, with its connecting pipes, is the result of long study and experiment upon that problem. The building can breathe, through these devices, no matter in what direction the wind may blow, or whether it blows at all or not. A sudden shifting of the wind to any point need cause no alarm, and no attention to it is required. Wherever the wind goes it finds the funnels in place to catch it, or if not needed, a little child can be sent to close down the cut-off, or to open them. When a strong draft of air is required in the building, the storm vane is raised, and, throat of turret being open, it will be done in a few minutes of time through the distributor; but if the condition of the tobacco requires that air should be forced through it, a base ventilating door should be raised in each section on the windward side, and the roof ventilator opened. If the tobacco is very dense in the lower tiers, and the incoming current strong, it will be best to open the arresters in each section, otherwise the wind will be likely to rush through the base air chamber, and striking the other side of the building will rebound in the tobacco on that side, and cause damage by drying and shriveling it up. The arresters break this current of wind, and it will take its course upward through the tobacco. It should be borne in mind that all these are extraordinary remedies for peculiar and critical conditions, and a whole season might pass without calling for a resort to them. The distributors are the common and ordinary means through which the curing tobacco is kept in a healthy condition, and reaches its beautiful transformation in quiet and certainty, and in total darkness, which is one of the conditions necessary to that result.

THE REVOLVING TURRET VENTILATOR.

The fourth item, in the plan of ventilating this curing house, is the revolving turret ventilator. It has an opening on one side for currents of air to pass through, up or down, and is suspended upon a pin passing through an

upright iron shaft. It has two vanes, one of which is called the down draft vane, drops down into the inside of the turret, through a thin slot, in its closed face. This vane when raised, will bring the open face of the turret to the wind, and is useful for letting cool damp air into the loft of the building during hot weather, at about and soon after the cutting is done: at such time the roof becomes heated, and the loft inside is intensely hot. It is a good plan every evening of a hot day to let the cool air into the upper part of the curing house, through this ventilator, for a half hour or more. This vane should not be left up only for such times and purposes, as, if the wind should rise and blow strong, it would do harm to the tobacco, and might unship the turret, as the wind has it at an advantage in that position. When the purpose is accomplished, lower this vane and raise the storm vane, which keeps the closed face always to the wind. This vane drops down into the air opening of the turret, and when raised is of course over it. These vanes are both of them raised and lowered from the walk, and a little child can handle them. The usefulness of this device will be apparent to all tobacco growers, as it will be seen at once that it makes the operator master of the whole situation, and as may often happen, it will need but limited use, in a whole curing season; it is there, however, ready if wanted. I have a crop of tobacco, grown the past season, and cured in this building. Its color is beautiful, while the veins and texture are all that can be desired, and the richness in gum and gloss are pronounced wonderful by all who have examined it; and I will take pleasure in showing it to growers, dealers and manufacturers, or any others who are interested, and yet during the whole season the roof ventilator was not once opened. The building and tobacco were freely examined during that time, and I never heard but one opinion expressed, that was that tobacco so treated must shed burn or rot. In fact, there was neither; so obstinate and tenacious are men, when once opinions are formed, and they are traveling in a beaten path, which they leave with great reluctance. Another advantage of this ventilator in connection with base ventilators is, that while in use ventilating the building the sunlight is wholly excluded, and there are few more destructive agencies in tobacco curing than sunlight. It should never fall on curing tobacco.

THE ARRESTERS.

The fifth item in the system of ventilation of this curing house is the arrester. It is a simple device to compel the air, which enters the base chamber, to deflect at the center of the building and proceed upward through the hanging tobacco. It is simply two wings made of common boards, about 30 inches long and 12 to 16 inches wide, hinged by the narrow side to a standard of 2 by 4 common pine lumber, and hung to one of the bearings in the lower story. Its purpose is to aid in those bad conditions which are common in all curing houses, when from threatening weather or fear of frost the building has been crowded with tobacco, only partially wilted, or that has been exposed to rain or falling

dew, and so in such stress it has been placed in the building in an improper and unsafe condition, as being a less danger than that to which it would be exposed if left in the field. The necessity upon the grower in such circumstances, is to at once bring a warm current of air through such a mass of tobacco, in order that it may take up the water from the plants and carry it off, and bring the leaves and stems immediately to wilting. The arrester is hung to a bearing, or as near as may be to such mass, and a small outside ventilating door is opened on the windward side of the building. The air will pass under the tobacco and will be met by the arrester, by which the current will be broken, and deflected up into the mass, and in a few hours time the wilting will be making fine progress. An expedient to overcome the difficulty mentioned is often resorted to by growers. They fix a set of long bearings outside, and carry the tobacco out and hang it outside upon the return of fair weather. This is much better than to leave it inside where it is sure to strut and burn in the common sheds. The air must go thoroughly through the tobacco to carry off the water; when that is done the wilting is easy. Of course it is best when the tobacco is once in the curing house that it remain there, and the elements that have made the trouble will rectify it if given a fair chance. When the downward draft is used these wings must be closed, which brings them at right angles with the sides of the building.

OUTSIDE BASE VENTILATING DOORS.

The manner of construction and use of these ventilating doors will be obvious to all experienced tobacco growers. This plan of ventilation calls for a careful and guarded use of the ventilators. As will be remembered, it has been laid down, as an important principle, that currents of air must not be permitted habitually to play through the building. The distributors furnishing all that is needed, except for extraordinary conditions, which have been detailed. If the weather is hot, while cutting, and the growth is large, and the building being filled rapidly, it will be well at night to leave a door in each section open two or three inches on both sides of the building. They will serve to cool off the heated tobacco and leave it in good condition, at the same time the throat of each turret should be opened two to four inches. While hauling in tobacco do not leave the driveway doors open on the windward side no longer than may be necessary to drive out or in. It is better to go round and drive in on the lea side and back the wagon out when it is unloaded if the wind is blowing strong, as in a few minutes time such a wind will blacken the leaves on both sides of the driveway.

THE INSIDE VENTILATING DOORS.

This device will be found very convenient and useful in many emergencies that are liable to arise during the most favorable curing season. They are 30 inches long and of uniform width, with the outside ventilating doors, that is about ten inches wide and should be well made of light material. They have

two sets of hangings, and have two offices to perform. At suitable distance from each end a common screw hook is fastened. Corresponding to these hooks are two sets of common screw eyelets, one set in the narrow board outside nailed to the base posts. The other set of eyes are fastened to the inside lower edge of the sill, and the door is shifted from one to the other of these sets of eyes. The purpose of this device is to aid the other appliances of the curing house in overcoming adverse conditions, either of the weather or inside the building. In the circumstance detailed respecting the arresters, this door will do good service; by hanging it to the lower hooks and bringing its other edge up and raising the outside ventilating door which covers it, a stream of air can be carried directly up into the hanging tobacco at any point, from the center of the building to the side, and raising it at a sharp angle will bring the current close to the side or in the outer tier, while lowering the door will carry it nearer the center. If the curing house stands east and west, the south side will be very much heated, and the tobacco will show the effects, and will shrivel and incline to dry green. This door will be found a most useful device to overcome that tendency. It should then be brought up to a sharp angle at night, or when it rains, and a current of cool moist air should be passed up the inside of the walls all night, or during a wet spell of weather, and so will equalize the temperature inside the building. Of course it should be closed on that side during hot, dry weather, as it can then help nothing. On the north side of a building, so placed, it being continuously in the shadow, the tobacco may be inclined to go too slow, as there will be a difference of several degrees in the temperature between the north and south sides of the curing house. The heat being less and less absorbing, there will be need of passing air from the outside into the tobacco, to prevent its goin g into a cold sweat, as that condition always precedes shed burn; and for that purpose it will be manipulated in the same manner as already described. These doors when hung from the upper fastenings, serve a good purpose at such times, as it becomes necessary to carry a strong current of air into the building. By bringing the lower edge of the door down near the ground, the current of air which would otherwise rush through the outer door, would strike the tobacco with too much force. While the air is needed in the building, its violence must be toned down, and that is effected by its being broken against this inside door, from it the wind will rebound against the ground, and when it takes the upward direction, its violence will abate, and whatever of current it may have, it will be gentle and without commotion.

As I shall have occasion to speak further respecting the ventilating doors, when I reach that part of the work, wherein will be discussed the matter of putting the cured tobacco in case for stripping, I will not now further occupy time with them. On account of the novel features of the building, and its plan of curing, I have felt constrained to go into minute details, with a view to its being understood. It will strike some persons, no doubt, as being elaborate, too much so, they will perhaps conclude, for simple and practical use,

but they could hardly make a greater mistake. A little study will give a fair comprehension of its devices, and the ease and certainty with which it does its work will surprise everyone.

IN THE FIELD.

Returning to the tobacco field, which we left to explain the curing house and plan of curing, which is advocated, we take up again the cutting and hanging the tobacco. I will state first why I urge leaf growers to abandon a practice which is slovenly and illy fitted to the handling of the tender leaf of a good growth. A course growth might not be injured. The practice of spearing and hanging the stalks upon laths is now almost universal, and it is doubtful if a better way can be devised, unless it might be that the practice which originated in Connecticut, and is followed by many good growers there, of hanging upon hooks, which have been permanently fastened to the lath, is a better way, thus doing away with the spear and any deterioration of quality, which has been thought to follow the splitting the green stalks, as hastening the drying up of the sap in the stalk.

In October, 1885, I met Mr. Phelps, President of the New England Tobacco Growers' Association, a gentleman of fine discriminating judgment and large experience in all matters concerning tobacco, and he discussed, in an entertaining and instructive manner, among others, the methods of hanging tobacco. I have been strongly impressed ever since with the utility of the system of hanging on hooks, as explained by him, and I intend the present season to try the plan upon a scale large enough to be able to satisfy myself of its value as compared with the present practice. At the present I do not know of a better way than that of spearing the stalks now in vogue.

We will now proceed with the cutting and hanging. The grower should have a tobacco rack of the following dimensions: Two bed pieces 2x8 eighteen feet long, two top pieces 2x4, same length; six standards 2x4 five feet long; three girths 2x6 tenoned at each end, to enter mortises in the two bed pieces, framed of a width to enter between the wagon stakes. The standards are bolted each with three bolts to the outside of the bed pieces. The lower end of standard being a little shouldered to rest on the upper edge of the bed piece, to relieve the bolts from a part of the weight of the load. The two pieces of 2 by 4 are bolted to the top inside of the standard, being shouldered to relieve the bolts. Across the top of the bearings in front, nail a narrow board for seat for driver. At the center place a swing hook, hung onto a staple fitted to one bearing, with an eye and a grappling hook, to swing over and clasp the other bearing. This binds the load together and prevents its spreading, and keeps the tobacco from rubbing and chafing, and is strong. When the wagon is unloaded up to this grappler, lift it and swing it around and drop it on the side it is hung. He then should make, for a small field two, and for a larger one four filled racks, into which the tobacco should be placed, on taking it from the spearing horse, for the custom of laying down

in piles, in the field on the lath, waiting for the wagon, is too slovenly and unworkmanlike to be tolerated, and it ought to be abandoned at once and forever. There is every imaginary reason against and not one for it. This is the bad custom to which allusion is made at the beginning of this subject. Often it is laid, ten and twelve sticks in a pile, and left lying for hours in the sun. The leaves in the whole pile, except at the top, will be bruised by the big hard stems below and above them. Careless and thoughtless workmen will swing the stick of tobacco up above the pile and let it fall heavily, grinding and crushing whatever comes together. Another among many good reasons against the practice spoken against is: In the best managed field the surface of the ground will have innumerable objects of all shapes and forms to pierce, tear and bruise tobacco, laid down upon it, little sticks, straws, bits of weed stalks, will be stabbing it, unseen by the grower, but they get their work in, and it constitutes a large per cent. of the fine leaves, which by such defects are made to take a lower grade. Such per cent. of loss from these causes would go a good way towards paying the cost of harvesting the field. The stalk when cut must lay where it falls on the ground, until it is wilted. There seems to be no other way, but when it is strung it should be from the rows, where it was laid, and then carried at once and hung in the field rack to wait for the wagon.

A good rack for the purpose may be made from poles four or five inches thick, and 16 to 18 feet long, with legs about five feet long, sharpened a little to enter the ground, and standing a little wider at the bottom than the top, with some braces to keep it erect. Such a rack will hold from 40 to 60 sticks, and when emptied two men take it up easily, and carry it up to the field, convenient for filling again. An active boy should be employed to gather the plants from the row, and bring them to the man at the horse for spearing, two rows may be taken at a time, and the horse moved along, to keep in proper distance, and not carry the plants too far. The wagon rack will hold about 70 sticks, unless the plants are very large. They may be pressed gently together, so that the leaves will not chafe, generally about five inches apart, or a little less, being careful to have all the leaves straight. About six stalks to the lath is plenty.

We now proceed to hanging the tobacco in the curing house. To this work to which we now come, the grower must bring care and judgment to superintend what is to crown all his previous labor with success or failure. His efforts in the field have been mainly such as are bestowed upon most field crops, except in a few particulars incident to this crop. In the curing house all the work is peculiar, and requires a steady brain and careful hand. I am aware that the plan of placing the tobacco in the curing house, which is described and advocated here, is contrary to the practice most in vogue; but I shall endeavor to show, as I pass along, very excellent reasons why this is the best plan. Taking the load into any one of the driveways, if there are more

than one, one man on the wagon passes the stick of tobacco over the bearing, another takes it and places it at the further end of one tier, and so on till all the tiers in that division are full. Do not crowd it, but let the tips of the leaves just touch; ordinarily that will bring the sticks from 5 to 8 inches apart, depending on the wilting and the growth or sizes of the plants. Then go to the other side of that driveway and fill the first division on that side in the same manner, and so enter the next driveway, if there are more, and fill the first divisions on the right and left of that driveway, and proceed until the ground story is half filled, excepting the driveways. No tobacco should be placed in them until late in the cutting, unless there is threatening weather or frost is feared. You have now one empty division in each section, and one full one. After 11 o'clock in the forenoon no tobacco should be lying on the ground, when the sun is shining, until about two o'clock. The team may be tied up, and the two who have been hauling in the tobacco should then go into the building and move the tobacco into the rear divisions throughout the curing house. The two will shift a division in about twenty minutes. Each tier will hold about 18 sticks, and in the eight tiers of a division, first story, there will be about 150 sticks. There will now be space in the first story for what you will be likely to put in during the afternoon, and at night the first story of the building is full. If there is any exigency, which requires extra efforts in the field, the man who hands the sticks up to the driver, as soon as the wagon is loaded, may go immediately and help in such emergency. The driver can unload the wagon alone almost as quick as two can do it, by having a 12 foot plank to walk on, one end of it being laid on the bed piece of the rack, the other end on the ground in the tier to be filled, and shifting it into another when that is done. In any event unless help is cheap and abundant, it is far the best way. At this placing it is not necessary to pay very much attention to the spacing of the stalks on the sticks, but those who are spearing should exercise some care, and not crowd the stalks together. A habit should be formed by them of quickly pulling each stalk pretty near to the place on the stick that it ought to occupy. When the stick is lifted out of the rack, before placing it on the bearings, it should be shaken gently, right to left and back, two or three times, to separate the leaves that have been pressed together, and to open them about the stalks.

The following day we shall require space in which to hang tobacco, as the cutting is to go right along. The tobacco will not bear handling towards sun down, although the suckering may be done, if needed for the next day's cutting, as the suckering and cutting should be kept close together. A part of the force can put in an hour in the curing house before dark to good advantage. Each one should be provided with a piece of strong board about five feet long, and as many inches wide; going to the tier first laid, begin at the back side, move the sticks apart and lay his board on the bearings, then lift the outside stick, shake it gently, run the eye quickly over the plants, and see

if they are not crowded onto the center of the sticks, which is most likely the case. Placing the lath on the bearings, in the second story, pull the outer stalk at each end out to the bearing; see to it that the stalks hang straight down, and that they do not crowd each other; give each stalk its share of space. It may happen there are crooked stalks on the stick; all such stalks ought to be put at the end of the lath and turned outward, where there will be space into which the crook may throw the top, and avoid its kicking into the other plants. It is a good plan to break such stalks at the bend or elbow, to remove all possibility of their doing damage. At this raising the sticks may be moved a little closer together, as the plants have probably wilted some in the building. In the evening and following morning before work can be resumed in the field, all the divisions filled can be moved onto the second story. Fill the first story again in the same manner as at first, then proceed in about the same manner to move the tobacco up to the third story. The tobacco having been carefully examined, shaken out and spaced in the first removal, this second can be done very rapidly, only do not handle it roughly. When the two first stories of the building are full, it may require nearly half of one man's time in handling it, and the outside work should be planned with that in view. There is no part of the business where judicious and careful work will pay any better, and the best man should be placed in the curing house. The tobacco is thus every day passed in critical review; instant notice is taken if the appearance is any way wrong; if there is, that tobacco should be placed where it can be specially treated by removing it from the mass, lowering it to the ground or carrying it up. Generally if the stems soften down there is no trouble, but if they stand out and stiffen, take it out of its place and put it where the warm air can touch it. Unless there has been hasty and careless work in placing it on the first story, by unduly crowding it, trouble of that kind is not likely to arise, but it should be discovered and corrected before it leaves the second story. Having no further to go when placed on the fourth story, it should be placed with care, generally about four inches between sticks.

There is now a great mass of green tobacco in the building, and more care is necessary in placing it. All that is put in, after two stories are full, should hang without touching, to insure a certainty that all parts of the plants are touched by the warm air to the end that the wilting, which is often imperfect, when it is brought in, may be completed before it will have to take its place in the mass with green tobacco above it and below it, and at each side. The operator should understand the danger of placing half wilted tobacco in the midst of such a mass; it will start on a new growth, and of such extraordinary vigor is the plant, that in such condition it has been known to grow large suckers in the building, that have blossomed and formed seed pods. A warm current of air will soon correct such a state of things.

This proceeds until the crop is in the curing house. In placing the last

cutting, which by this plan will come onto the first story, the same care must be exercised as in placing the tobacco on the upper stories. It must be placed more open, and the stalks carefully spaced on the sticks, and they must be placed at even distances apart. During the week or ten days succeeding the final cutting, the curing house should be carefully examined every day, both from the ground and along the walk, moving the sticks aside and passing the hands over the tobacco in the tiers to the right and left of the walk. If any of it feels damp and clammy, and the veins somewhat hard and stiff, it needs air at once; open an outside ventilating door nearest to the place, and bring the inside shifting door upward to such a position as will be most certain to turn a stream of air into it; examine it two or three times a day, or until it seems to be coming into good condition. The upper tiers should also be examined every day during the first ten days. The first cutting ought now to have taken on the yellow colors which follow the ripening and precede the curing and coloring, and the grower, in this building, having easy facility in the inspection, ought to know every day that the curing is progressing evenly and with uniformity in every part of the curing house. Once or twice a day the air should be changed by opening the turret, as the green tobacco is throwing off a great quantity of gas, and the air will become very heavy and foul. On rainy days keep the building closed, and send a current through the inside ventilator up along the side of the building to overcome the drying tendency.

As I have shown elsewhere, there ought to be no drying of the tobacco while the curing is in progress, and there is neither reason nor sense in the practice of throwing the building wide open during a wet spell of weather while curing, in order, as it is said, to have the "come and go" improve the color. When the grower has cured one crop of tobacco on the plan herein suggested, he will smile when his memory reverts to what he read in treatises on tobacco curing, about softening of his dried green tobaccco, in order to finish the curing and coloring by exposing to wet weather. Such treatment will spot the leaf and blacken it. In the nature of things, the leaf should have, in the stalk and stem, all the moisture it needs or can take care of. The dampness coming to it from outside is unnatural, and disturbs the curing process, and should be rigidly excluded except for the occasions and in the manner which I have elsewhere mentioned. When the tobacco has all taken on color, you may close the curing house and lock it, but it will even the colors to dampen it once or twice before freezing time comes.

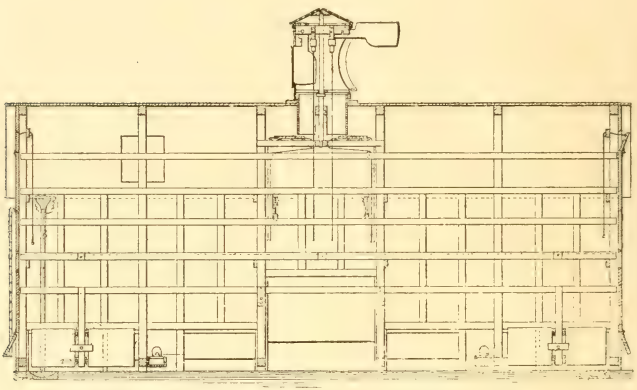


FIGURE 1

Is a vertical longitudinal section of a curing house embodying my improvements. The turret ventilator is shown with the storm vane raised, and the down draft vane hanging inside the turret. The simple devices for lowering and raising these vanes as shall be necessary also appear.

One of the most admirable features of this curing house, the inspection walk, is shown by the double lines and the dotted line between them running the whole length of the building between the second and third stories; thus, as will be seen, carrying the inspector through the midst of the mass of hanging tobacco at its vertical and longitudinal center, and it will be obvious to the tobacco grower that the first appearance of bad condition will be instantly detected by the inspector from this walk, and the facilities for correcting them are at his hand. The walk should be about two feet wide, or a little more or less. This vertical air chamber in which no tobacco is hung is a saving of space as the ease and certainty with which currents of air may at all times be drawn to or from all parts of the building by this plan enables the grower to save nearly one-third of the distances in placing the lath. That is, on all the bearings above the first story, he may place nearly three laths where two would be placed in any other plan of building. This close placing contributes largely to beautiful, high and uniform color.

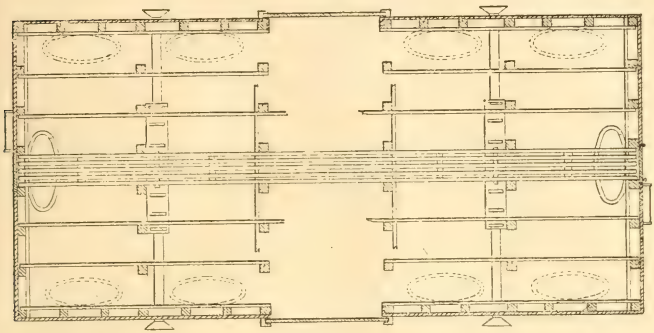


FIGURE 2

Is a sectional plan view of the curing house, showing the inspection walk, and below it the distributors in each section with their connecting pipes running under the hanging tobacco from the air funnel outside close to the ground where it receives the fresh air and conveys it, without coming in contact with the tobacco along the side of the building, to the distributors, from which it is discharged through their slotted upper surface in the center of the mass of curing tobacco.

I feel fully warranted in assuming that intelligent tobacco growers from the earliest attempts to grow and cure the plant have seen the great want of some plan or device whereby pure air may be supplied to the curing house without carrying it against the curing tobacco along the sides of the building through vertical or horizontal doors in the body of the building. The damage done by such awkward contrivances would strike the grower forcibly every time he examined his curing tobacco, and hence it would seem inevitable that the early growers of tobacco must have earnestly desired a more philosophical way of managing the elements and of avoiding their attendant damaging effects. Properly placed in the building, tobacco in this curing house cures itself as it ought to do, while the rapidity with which the air is changed in the building enables the grower to hold it up to a high condition of temperature which is absolutely essential to a high color, gum and gloss, smooth and handsome veins, which go to make the value of wrapping leaf.

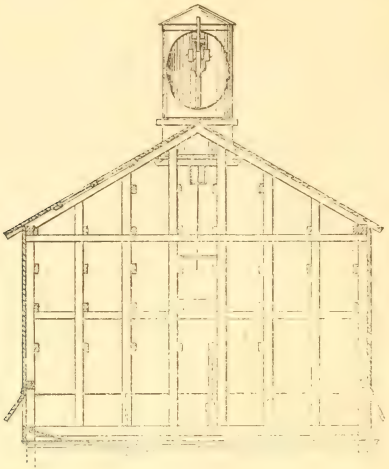


FIGURE 3

Figure 3 is a cross section elevation, showing the open face of the turret, the sliding doors which close the throat of the turret, an end section of the walk, the small entrance door below the walk, the inside shifting deflecting doors, and outside base ventilating doors.

It will be seen that there are three tiers of tobacco each side of the walk, or six tiers as shown, but it is obvious that if desired the building may be planned for eight tiers, or four each side of the walk, without changing any detail of the plan in any other respect.

The great strength of this plan of building will not by tobacco growers be considered the least of its merits. By looking at figure 3 it will be seen that all the standards which support the roof and the bearings with their loads of tobacco, all rest upon sills that are tenoned at each end through the base posts that are set deeply in the ground, thus making the roof and all the matter inside serve to hold the building in place, while the system of sections and cross driveways leaves the system of bracing in each section perfect as that of an independent building. The removal of the loose bearings in the cross driveways not in the least interfering with the system of bracing in each section. Whereas by the plan most in vogue of a driveway lengthwise through the curing house, making movable bearings necessary for its entire length, weakens the building in all its parts, and when it is assailed by a storm, its first tendency is to collapse, because the weakness is in the whole structure and all its parts, and there is no sturdy reserve such as a section of this build-

ing presents to support the long structure whose inside vital muscles and timbers have been cut away or loosened to afford a driveway.

But that feature of this plan which ought to commend it to tobacco growers, if nothing else does, is that its plan places the ends of the tobacco lath to the side of the building, thus so leading its channels between the sticks the short instead of the long way of the building. In this plan they lead from both sides of the walk into the center, vertical air chamber, where they are at all times subject to the upward or downward draft, through the turret ventilator.

STRIPPING.

The tobacco should be subjected to one good freeze, and then be on the alert for an opportunity to take it down. Usually in December there comes a few warm, damp, foggy days, without any wind. This is your opportunity and don't miss it, even if you have to get out of bed at night, but anyway get the building open. If you can discern any current of air, even slight currents, open on the windward side, keep the other side closed tightly. The reason is that if you open both sides of the building the current of air will naturally go through under the tobacco and pass out at the other side, dampening perhaps the first story; and if you open only on the side opposite the currents of air, they will form a draft from the inside of the building that will flow outward; by following the directions above, the quiet current will flow into the base chamber, there it will then be modified, and the damp, still air will fill the building. It is understood that we need no current to pass up out of the building; for currents of air will dry as fast as the dampness will moisten the tobacco, and it has been found to be a slow process to put tobacco in suitable case for stripping, in any manner of dampness, that is carried in a current of wind. In the tobacco sheds of the day, the dampness cannot be got into the building, unless the wind carries it in; and as already shown, the wind defeats the purpose, and so often as I have known, the grower struggles with the elements a week or more to get his tobacco in case, and then fails to do it from these causes. With this curing house the damp air passes freely into the base air chamber, and it being dry inside, absorption begins at once. The air chamber will be kept full, and in a surprisingly short time the whole building will be filled with damp air, because there is no counteracting agency except absorption. My own curing house is one hundred and fifty feet long, four stories high, and twenty-eight feet wide, and in 12 hours I have put the whole mass in beautiful case, and taken it down as fast as three men could put it in bulk. If the wind should suddenly rise, after the tobacco is in case, or any part of it, and change to freezing, the curing house should immediately be closed up tight as it is possible to make it. The tobacco that is in case can be held there until you have had time to take it down.

TAKING DOWN TOBACCO.

In this curing house there will be very little, if any difference, in the case in any part of the building. It will, in fact, be uniform wherever it is in case. The hanging tobacco, receiving its dampness from the base air chamber, it must necessarily be evenly distributed, as it is not carried against the body of the hanging mass, as in common sheds, by the currents of air, which puts that near the building too high, and a short distance into the building there will be scarcely an appearance of moisture, but in this plan it proceeds upward among the leaves, and the whole mass of tobacco is equally accessible, at all points, from the base air chamber.

Begin at that place in the curing house most convenient for your work. The ground should be always perfectly neat and clean, and be evened down smooth, and should be free from sticks, stalks or rubbish, and nothing should be permitted to lay around on the ground. On the first story it may be taken directly from the bearings and laid in piles, the sticks outward, the leaves lapping. Put about 20 sticks in a pile. Do not lap so much as to bring the leaves over onto the butts of the stalks, as they are liable to be torn on them. Do not pitch the sticks, but take them in the hands, and raising up to the pile, be careful and not throw the leaves of the sticks you are handling against the rough ends of the stalks in the pile. In short, in all the work of taking down and bulking, be careful and do not pierce and tear the leaves. These piles, although placed temporarily until you can get to them to strip off the stalks, ought to be laid up square and even, the sticks being one above the other on both sides of the pile. If one stick is thrown in carelessly, its leaves will reach beyond the pile on the other side and they will be torn, at the same time, whatever leaves come on top of a stick so placed will be damaged. If the crop is a large one, and the condition favorable, a force should be organized, so that two men can keep right along taking down, and four men be employed in removing the stalks from the lath. It is not a neat way to place the tobacco on the ground. If the ground is very damp, it is liable to soil the leaves, even the few minutes which it will lay in piles. If rain or snow has got into the building, you must put something on the ground on which to lay these piles. Having arranged all that matter properly, take some smooth boards and lay down a bed about four feet wide, placing the boards close together, in one of the driveways lengthwise on the ground. A bulkhead should be built of smooth boards, to keep the end of the bulk up square, as wide as the bed. In taking the stalks from the lath, two men work together, one take one end of the stick firmly in both hands, the other stands opposite to him and near the bed, and as the first raises the stick between them, he grasps the stalks at the end from him, one hand above, the other below, but near the lath, and by a quick pull on the part of both of them together, the lath will be pulled out, and the second man will have the stalks in his hands; he then turns about and lays them down smooth and even on the bed, the butts out

and the leaves in. On a bed of that width the stalks will, with ordinary growth, lap sufficiently so that the bulk will be solid throughout, as if there are places which are not filled and pressed hard they will dry out. After laying two tiers round the bed, a smooth board should be laid on the pile and pressed down hard as possible by the weight of the two men. Removing the boards, they will discover whether the bulk is begun too wide or too narrow, and thereafter lay on the stalks as may be required, to keep the whole bulk even and solid. To work according to some plan is a good way to secure uniformity, and this is a good form for this work. Lay down on the bed the first stalks taken off, then lay the next handful of stalks smooth and even on top of them, then lay the next handful on the bed alongside those just placed; then the next or fourth handful on top of it, and so on round the bed, each tier being composed of the tobacco from two sticks, laid double. In this manner the layers will all be alike, and there will be less liability to get uneven places in the bulk. The butts should be laid even, because if some are out and some in, they will let the air in and the lower leaves will be dried out. A bulk four feet high is as high as is generally necessary; but if the entire house full is to come down, and you are prepared with a large force to strip, it will require two bulks to be laid in the driveway, and the first must be laid with reference to it.

When the tobacco is in the bulk it must be covered on the tops and sides to hold the tobacco in case. Boards can be put up at the sides and also be laid on top. If more convenient, corn-stalks piled against the sides make a good covering. It is only important that the air be shut out. If you are obliged, for any cause, to take the tobacco down later in the season than has been intimated, it must be all stripped within ten days after taking down, or there will be danger of its heating in the bulk, and that must not be permitted. If the weather continues steadily cold after bulking down, as early as December or January, there will not be danger of this heating for two weeks or more. The condition of the stalk, at the time of taking down, has much to do with the safe keeping in the bulk. If the stalk is well dried out there will be little danger, but if it is wet and soft, beware of it. The bulk must be smaller in that case, and it should be stripped as fast as it can be done. In addition to the danger of its heating, the wet stalks will soil and damage the leaves whenever they come together, if allowed to remain long in bulk. With this building tobacco can go immediately into cases as fast as stripped, and therefore I omit a plan, which is requisite in tobacco sheds, of banking stripped tobacco, to dry wet stems, before casing, as it will never be necessary.

THE STRIPPING ROOM.

The stripping room must be a close, warm room, where a steady fire can be kept, with room adjoining or near, in which to store the bundles. The bundles ought to be about ten inches square, and will vary in length as the tobacco is a large or small growth. They will ordinarily be about two feet to

thirty inches long. That they may be uniform in size and for convenience, make a box ten inches square inside measure, and about three feet long of planed pine boards, and set it on legs about twenty inches high, nail an end piece in one end and leave the other end open; then fit a movable cover that will just go down to the bottom. Cut three gains on each upper edge of the side pieces of the box, into which you lay the string, that is to tie the bundle when it is completed. One string should be about five or six inches from the closed end of the box. The other two should be placed so that the center string will come about round the center of the bundle, and the third five or six inches from the end. Provide a few balls of wool twine and cut it into pieces long enough to go round such a bundle and tie on top. When you have determined just the length you require, cut up the twine and hang up convenient for use. Then provide some straw paper, usually kept by merchants for this purpose. Lay the strings in the bottom of the box, the ends hanging over the sides, and place a sheet of paper smoothly in the box and press the ends of the sheet over the side board, so that they will keep in place. You are now prepared to bundle the tobacco.

Tobacco growers find in every crop they grow a diversity of quality in the respect of fineness of grain and purity, and evenness of color. Beyond all doubt, the first named quality it takes into the curing house with it. The latter are largely influenced by the treatment in the curing house. At this time, confining our attention to the matter of sorting the tobacco, I will first state my way of doing it, and then will speak of the general practice.

The late cut tobacco will be of darker colors than the earlier tobacco: the curing will be slower, as the days are not so warm, and the nights are colder. So far as it is possible, without too much hindrance of the work, I keep the light and dark tobacco separate in the stripping room: a stalk of dark leaf found among the light, is handed to one who is stripping dark leaf, and the same with the light leaf found out of place. I have two stripping boxes, which are being filled at the same time. Thus the bundles are dark and light, and the weight and a letter designating its color is placed on each bundle. When once arranged and understood, this does not in the least delay the work. Taking a stalk in one hand, strip all the leaves from the bottom to the top, except trashy ground leaves, which should be thrown out. When a handful is gathered lay the leaves smoothly in the box, the butt end of the stems evenly against the end board. Place two or three handfuls of leaves the same way, then turn the next two or three handfuls the butts the other way, and lap the leaves so far as that the bundle will be solid in the middle, otherwise it will dry out. Fill the box in this manner, frequently pressing it down with the hands. When full up to the top of the box, place the follower on top, and two persons put their weight on it. Then remove the follower and fill up. In this manner, a bale of 35 to 40 pounds will be formed. Tie it by carefully bringing the ends of the paper to a lap, being careful not to tear or break the

paper, and tie a slipping knot, and the string can be used again. If it is intended to send the tobacco to a packing warehouse to be sorted and cased, then in that case the fillers ought not to go into the bundle, but be taken from the stalks, tied in small neat hands and immediately packed in cases of about 300 pounds. The reason is if your tobacco has been kept in proper case, there is nothing difficult about packing the fillers, but it should be done by a person who has had experience. If they are sent to the warehouse to be sorted and cased, the price you will get for them will about pay the cost of packing, leaving you nothing for your tobacco, and of course it would be better to leave it on the stalks; but you can put it in cases much cheaper than the warehouse; and if the tobacco is to be sold in the bundle it will bring a better price, for the fillers being out, and generally they can be included in the sale. It will be better, respecting all such matters, for growers in all sections of the country, to confer with buyers, and learn what they wish, and then put up their tobacco in conformity to it, remembering to do every part of the work neatly and well. In stripping, all the work should be cleaned up at night. Leave no tobacco on or off the stalks lying around loose and uncovered; but cover up everything snug, otherwise it will dry out and cause trouble. Having weighed your bundles, you will get the quantity you have, and provide the requisite number of cases, and have them in or near your sorting room under cover; they should be of seasoned lumber. On no account should tobacco be put in green or wet cases.

Having my tobacco all in bundles, I engage experienced and careful women for sorters,and arrange the table for 6 sorts or grades, long wrappers, medium wrappers, short wrappers, seconds, binders and fillers. All the long and medium wrappers are gathered from that table and taken by an expert who sorts them into two grades of each kind, placing all long leaves of a like fineness and color in one grade, the coarser leaves in another, of same size leaf. The fillers, binders and seconds of all kinds of leaf, are tied in neat hands and kept separate. The grades then, of the tobacco, will be fine long wrappers, long wrappers, fine medium wrappers, medium wrappers, short wrappers, seconds, binders, fillers. This grading into two additional grades will scarcely pay, in a small lot, of a ton or less, but in a large lot it will pay, being careful to let no defective leaf go into either of the five grades of long or medium tobacco. The short wrappers of all qualities are handled together, and the same with the seconds; the fine grading is confined to long and medium wrappers. In sorting a small lot of tobacco, it should be put in five grades, if the fillers are in the bundle, and place damaged leaves of wrappers in the seconds. In casing and sorting, observe the rule to have every kind of tobacco in the sorting room put in its place and kept from drying. Leave no tobacco lying about on the tables.

Where tobacco is taken down, in the perfect case, which is easily attained in this curing house, and the bundles have been kept in a proper store room,

and is assorted in a warm room, its case will remain simply perfect, and it ought to go at once into the pack. To bank it, as is much practiced, and leave till spring, is well where the stem is soft and requires drying out, indeed, that is the only safe course: but it does not come out of this curing house in that condition. The leaf will break square off from the stalk, as the stems are cured, the same as the leaf, and there is no sap left in the stalk; it has taken its place in the leaf, stem and veins, where it ought to be. The wrappers of all kinds should be kept in their respective cases by one used to packing tobacco, and then put in the press each for a few minutes. The case of fine wrappers may be left in the press over night, all the other cases in process of being filled should be well covered to exclude the air. Put three hundred pounds in each case and nail the covers down, and store them in a cool, dry room, place two narrow strips of boards one inch thick on the floor, and place the cases on them, off a little from the wall of the building. This will give a place for the air to circulate all about the cases.

If your crop has grown in an average good year and not too wet, especially not cut during a rainy time, it will have a strong and elastic fiber and abundance of gum. Under those circumstances it will bear packing 300 pounds in a case and come out with strong fiber and rich, glossy color; but if the season of growth has been a wet one the growth will be rapid, the leaf thin, and the fiber will not be substantial nor strong. There will naturally be a great per cent. of water in the leaf, if added to this you are obliged to cut your tobacco in a wet time, you must beware how you pack it. With those conditions there should not be more than 250 pounds at most be put in a case, and the cases must be stored in a dry, well ventilated room, and not be piled top of each other.

The reason is the gum is put out and incorporated into the leaf only in a hot, dry time. Hot weather makes a rich, strong leaf full of gum; wet weather makes a weak, thin leaf poor in gum, and in such a leaf the gum is on the surface of the leaf, and is being constantly washed off. If you put cases top of each other, lay like strips on them, to secure circulation between the tiers of cases.

There is an important fact connected with this matter of putting tobacco in case not generally understood. Growers sometimes take a quantity of tobacco which happens to be in very high case, too high they think for safety, and so they case it with about an equal quantity of tobacco in a very low case, too low they fear to insure a good sweat, hoping thus to harmonize the differences and out of the average procure good case for the whole bulk; but there is at work against him in such enterprise a very silent and subtle philosophical law which will doubly defeat all his plans. The excessive moisture in one part of the case by the power of capiliary attraction will draw all of the moisture out of the low case tobacco and leave it dry, while the excess receiving such an addition will rot the portion in high case, presenting the

strange spectacle of the dried tobacco lying amidst covered and surrounded by the wet damaged tobacco. Growers will, therefore, see the necessity for perfect case in their tobacco. In fact, tobacco too high or too low ought not to be taken down, but left on the bearings. Nothing can surpass the manner in which this building puts tobacco in case. It leaves nothing further to be desired.

SELLING THE CROP.

It is not an easy matter to fix general rules for the sale of the products of the farm, and tobacco has as many and as strange ups and downs as any other crop. It is easy to tell the grower that he must be wide-awake and observant of what is going on about him, and watch the market reports, and all of that; but notwithstanding vigilance to that extent, and more, the grower will often come to regret for selling too soon or holding too long. There is a rule, respecting this business, that has much to commend it, and those who adopt it will have many compensations, whenever it happens that some neighbor has made a little money by holding. Whenever a farmer has his crop ready for the market, whether it is special or a general crop, and there is a market with a fair price for his product, that is a good time to sell and deliver. It is true the market may advance. It is also true that it may decline. When the buyers are in the country buying up a special crop at a fair price, that is also a good time to sell. The money in your pocket will be handy to buy necessaries or pay bills. You will be free from danger of fire, shrinkage, and many peculiar drawbacks on a special crop. Interest can be stopped on bank notes with the proceeds, and, what is worthy of consideration, a good name will be established for prompt payment of bills. All things seem to be inclined to go against a farmer, who speculates on his products. His policy will lapse and then a fire wipes it all out, or he will be tempted to send it to a commission house, and if anything comes back it will not be satisfactory. A fair price and money on delivery of the goods is, all things considered, the best.